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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/606,252	06/28/2000	Raminda U. Madurawe	A293D	5633

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TOWNSEND AND TOWNSEND AND CREW LLP/ 015114
TWO EMBARCADERO CENTER
8TH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

BROCK II, PAUL E

ART UNIT PAPER NUMBER

2815

DATE MAILED: 07/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/606,252

Applicant(s)

MADURAWA ET AL.

Examiner

Paul E Brock II

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-31,33-38,40 and 42-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-31,33-38,40 and 42-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 11 June 2003 is: a) ☐ approved b) ☒ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on June 11, 2003 have been disapproved because they introduce new matter into the drawings. 37 CFR 1.121(f) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing of the enhancement implant 130 as only existing between pocket implants 210 as shown in the proposed figure 4. The enhancement implant should at least also be shown as existing between the pocket implants and the source and drain regions.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 27 – 31, 33, 34, and 45 – 47 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is not clear how a single mask can be used to accomplish depositing a field implant, depositing a well implant and depositing an enhancement implant. Figure 4 and the specification on page 7, lines 7 – 18 states “Mask region 410 is the mask area defined for formation of well 140, ” and continues to state that “Well 140, field implant 120, and enhancement region 130 (for enhancement transistors) can be formed by implanting at different energy levels, using only the mask defining mask region 410.” The first statement can only lead to the interpretation that there is a mask in the area defined by mask region 410 when forming the well 140. How can the well be formed when there is a mask over the area where the well is to be formed? Since there is a mask in the mask region over the to be implanted well region, one of ordinary skill in the art would not recognize that the well region could be implanted. The second statement can be interpreted that this mask is present for the formation of the well 140, field implant 120, and enhancement region 130. Field implant 120 is shown to exist outside the area of the mask, while the well 140, and enhancement region 130 are shown below the mask. One of ordinary skill in the art would not know how a mask can succeed in both blocking implant x (field implant) from area “A” (under the mask)while blocking implants y and z (well and enhancement implants) from area “B” (outside the mask). It does not appear that a single mask could accomplish this function while only “implanting at different energy levels.” For these reasons, the specification does not enable one of ordinary skill in the art to accomplish the claim limitation “wherein the implanting the field implant, the well implant, and the enhancement implant are done using a single mask.” Further, any suggestion that the originally filed specification discloses using a mask for only the field implant to form region 120 is not persuasive. The disclosed profile of the well region would not suggest to one of ordinary skill in the art that the field oxide regions 150

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are used as a mask for the well implant. This is due to the continuous profile of the well region directly under the field oxide regions 150. If the field oxide regions were used as the mask for the well implant there would be a noticeable profile defined by the implant passing through the field oxide region, and there would be no definite boundary of the well region as shown in figures 1a and 4.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 27, 29, 30, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al. (USPAT 5763921, Okumura) in view Yuki et al. (USPAT 5466957, Yuki).

With regard to claim 27, Okumura discloses in figures 2 – 7 a method of fabricating a transistor in an integrated circuit device. Okumura discloses in figure 2 providing a semiconductor substrate (1). Okumura discloses in figure 6 implanting a field implant (63). Okumura discloses in figure 5 implanting a well implant (62). Okumura discloses in figure 4 implanting an enhancement implant (61). Okumura discloses in figure 7 forming a gate oxide (7) on the semiconductor substrate. Okumura discloses in figure 7 forming a gate (8) on the gate oxide. Okumura discloses in figures 4 – 6 wherein the implanting the field implant, the well implant, and the enhancement implant are done using a single mask (4). Okumura does not teach

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pocket implants. Yuki teaches in figure 3b implanting (22) a first pocket implant (right side 21a) into the semiconductor substrate from a first side of the gate. Yuki teaches in figure 3b implanting a second pocket implant (left side 21a) into the semiconductor substrate from a second side of the gate. Yuki further teaches in figure 3b – 3d wherein the first pocket implant and the second pocket implant are in contact at about the center of a channel region. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the pocket implants of Yuki in the method of Okumura in order to suppress short channel effect while reducing the electric field concentration as stated by Yuki in column 1, lines 47 – 51 and column 4, lines 31 – 41. The pocket implants of Yuki result in an excellent semiconductor device, as Yuki states in column 4, lines 31 – 41.

With regard to claim 29, Yuki teaches in figure 3b the first pocket implant and the second pocket implant are implanted at an angle.

With regard to claim 30, Yuki teaches in figure 3b the first pocket implant and the second pocket implant are implanted using the gate as a mask.

With regard to claim 33, Yuki teaches in figure 3a – 3d; column 5, lines 51 – 67; and column 6, lines 1 – 11 forming a source on the first side of the gate and a drain on the second side of the gate, wherein the source and drain are doped at a first polarity and the first pocket implant and the second pocket implant are doped at a second polarity.

With regard to claim 34, Yuki teaches in figure 3b – 3d; column 5, lines 51 – 67; and column 6, lines 1 – 11 that the first polarity is different than the second polarity.

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6. Claims 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura and Yuki as applied to claims 27 above, and further in view of Sanchez (USPAT 5583067).

With regard to claim 28, Yuki teaches in column 5, lines 54 – 60 that the pocket implants are boron implants. Okumura and Yuki are silent to the fact that the first pocket implant and the second pocket implant laterally diffuse in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Okumura and Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45.

With regard to claim 31, it should be noted that “wherein the diffusing increases a reverse short channel effect of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Okumura, Yuki, and Sanchez read on the claimed invention.

7. Claims 35, 36, 38, 40, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuki in view of Sanchez.

With regard to claim 35, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21). Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left

side of 21a) into the semiconductor substrate using the gate as a mask. Yuki discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate.

Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing.

With regard to claims 36, it should be noted that “wherein the diffusing increases a threshold voltage of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Yuki and Sanchez read on the claimed invention.

With regard to claim 38, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21) having a surface. Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate surface. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left side of 21a) into the semiconductor substrate from the first side of the gate at an angle. Yuki discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral

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diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing. It should be noted that the claim limitation “adjusting a short channel effect of the transistor” is an intended use limitation which does not bear any patentable weight within the method claim. Therefore, Yuki and Sanchez read on the claimed invention.

With regard to claim 40, Yuki discloses in figure 3b wherein the first pocket implant and the second pocket implant are implanted using the gate as a mask.

With regard to claim 42, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21). Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left side of 21a) into the semiconductor substrate from the first side of the gate at an angle. Yuki discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps

will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing. It should be noted that “adjusting a short channel effect of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Kao and Sanchez read on the claimed invention.

With regard to claims 43, it should be noted that “wherein the diffusing increases a threshold voltage of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Yuki and Sanchez read on the claimed invention.

8. Claim 37 and 44 – 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuki and Sanchez as applied to claims 35, 38, and 42, respectively, above, and further in view of Okumura.

With regard to claims 37 and 44, Yuki and Sanchez teach forming transistors with pocket implants. Yuki and Sanchez do not disclose implanting an enhancement implant. Okumura teaches in figure 6 implanting an enhancement implant (63) in the semiconductor substrate. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the enhancement implant of Okumura in the method of Yuki and Sanchez in order to control the threshold voltage of the device as stated by Okumura in column 6, lines 56 – 62.

With regard to claims 45 – 47, Yuki discloses a well region (21). Yuki and Sanchez do not teach implanting a field implant, a well implant or an enhancement implant. Okumura

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discloses in figure 6 implanting a field implant (63). Okumura discloses in figure 5 implanting a well implant (62). Okumura discloses in figure 4 implanting an enhancement implant (61). Okumura discloses in figures 4 – 6 wherein the implanting the field implant, the well implant, and the enhancement implant are done using a single mask (4). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the single mask method and three implants of Okumura in the method of Yuki and Sanchez in order to suppress substrate bias effects thus improving device performance as stated by Okumura in column 1, lines 12 – 16.

Response to Arguments

9. Applicant's arguments with respect to claims 27 – 31, 33 – 38, 40, and 42 – 44 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

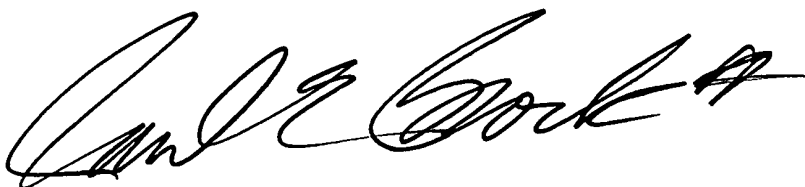
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II
July 22, 2003

A handwritten signature in black ink, appearing to read "Paul E Brock II", with a stylized flourish at the end.